

Embedding sustainable development goals in the DNA of Fire and Rescue Services

Fire & Rescue Services (FRS) organisations deliver complex services including fire-risk prevention, mitigation and incident response covering residential areas, buildings, industrial facilities, public infrastructure and natural resources such as forests and grassland. The purpose of a firefighting service is to improve human safety and security and protect assets whilst minimising impact on the environment.



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That purpose defines the basis for its contribution to a sustainable development of the world. A commonly used definition of sustainable development is 'development which meets the needs of current generations without compromising the ability of future generations to meet their own needs'.¹ This implies a world which provides a safe and just space for humanity to live in, respecting the planetary boundaries (ecological ceiling) and providing basic human needs (social foundation).²

Today, we collectively emit around 50 billion tons of CO₂ equivalent each year, an increase of 40% over 1990.³ These emissions come from: Energy (electricity, heat and transport): 73.2%; Agriculture, Forestry and Land Use: 18.4%; Direct Industrial Processes: 5.2% and Waste: 3.2%.⁴ According to the Global Fire Emission Database⁵ 6% of the emissions in 2014 were caused by fires.⁶ Most impactful fires are wildfires. Until recently wildfires were considered to have a neutral effect on global warming given the sequestration of CO₂ by new vegetation after seven months. The number of wildfires and their impact have reached a point that the Intergovernmental Panel on Climate Change (IPCC) in 2014 advised to include them in future climate change models.⁷

However, when in 2015 the UN issued the 2030 agenda for Sustainable Development,⁹ fire wasn't included in any of the 17 Sustainable Development Goals (SDGs) and 169 targets for 2030.²²

The UN SDGs together form an ambitious plan of action for People, Planet, Prosperity, Peace and Partnerships for the world. The 17 goals are integrated and

indivisible and they balance the three dimensions of sustainable development: economic, social and environmental. Firefighters can contribute to these global goals by reducing negative social, environmental and economic impacts of fire and creating a positive impact through a sustainable FRS organisation.

A practical model to address these integrated goals is the wedding cake representation in Figure 1.

The biosphere represents the physical ecosystem in which life occurs. It provides the natural resources and defines the environment for our society. The economy is built on top of society and uses natural resources. These three layers of the model work as an integrated system with multi-layer interdependencies. The SDGs are mapped on each layer, linking the goals to the ecosystem subcomponents. They are interconnected and only if all are addressed, the entire ecosystem becomes sustainable.

The question we want to address in this article is how each SDG is linked to fire and rescue services and what actions can be taken to maximise impact, either directly or through partnerships. The business case to do this is compelling: by embedding sustainable development goals in a firefighting service we:

- increase the health of firefighters and the community
- offer inclusive and diverse work
- attract employees with a common purpose easier
- reduce risks of climate change
- provide a better living environment for all species

Figure 1

The SDG 'wedding cake'.

Source: Stockholm

Resilience Institute.



- support sustainability strategies of local governments and corporations
- comply with legal obligations
- reduce short-term costs through energy and waste treatment savings and
- reduce long-term costs caused by business as usual not being prepared for climate risks.

As the world is changing, we are exposed to changing social, technological, environmental, economic, political, legal and ethical (STEEPLE) risks. FRS need to adapt and prepare for this changing landscape. Temperature rise, droughts, floods and natural hazards due to climate change, renewable energy, batteries, green buildings which use new building materials and structural systems (i.e. lightweight construction and engineered wood trusses), biomaterials, viruses, migration, etc. have an impact on the risk environment in which a fire and rescue service operates. New firefighting materials and tactics need to be adopted to mitigate these risks and reduce impact on biosphere, society and economy.

The burning question is: where to start and how to have the most impact? Assessing a baseline of the current social, environmental and economic impact of

the fire service through a Business Impact Assessment. Next step is to select the SDGs you want to focus on first, set goals, timeline and measure and report on progress with the objective to integrate all SDGs.

Tools

An excellent tool to use for a serious commitment to the SDGs and the UN Global Compact principles (covering human rights, labour, environment and anti-corruption) is the SDG Action Manager.¹⁰ This free tool can be used to perform the full Plan-Do-Check-Act cycle of embedding the SDGs in your organisation. Although there is no industry-specific template for a fire and rescue service available yet, the methodology can be used through the emergency services industry template.

Another useful guideline is the SDG compass¹¹ which contains examples of business actions and indicators per SDG. It includes 22 business tools that you can use when defining your actions.

The first layer: what are the biosphere SDGs and how are they relevant to FRS?

If we look at the base of the wedding-cake model, there are four SDGs which address the biosphere: 6, 13, 14 and 15.



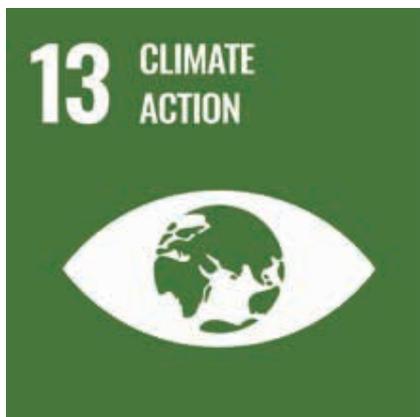
SDG 6 is about ensuring safe drinking water, sanitation and hygiene for all. This includes efficient use of water, treatment of waste water and improvement of water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials. Moreover, we need to ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from the consequences. Any withdrawal above 40% of the available freshwater (this includes domestic, agricultural and industrial use) is considered putting high stress on water supplies.

Only 3% of water on earth is freshwater of which 0.5% is available

for drinking, sanitation, agriculture and industry. The remaining 2.5% of water is freshwater locked in glaciers, ice caps, atmosphere and soil.

According to the United Nations, by 2025 an estimated 1.8 billion people will live in areas plagued by water scarcity, with two-thirds of the world's population living in water-stressed regions because of use, growth and climate change.

Water is a critical resource for firefighting, drinking and sanitation. Therefore we need to consider smart usage of freshwater as fire water as we are 'fighting fires with gold'. This means that firefighting operations should manage freshwater efficiently to assure the supply of safe drinking water to the community.



SDG 13 is about taking urgent action to combat climate change and its impacts. On one hand this implies reducing global Greenhouse Gas (GHG) emissions to well below 2% (target 1.5%) above pre-industrial levels.¹² For the EU this means 55% reduction of GHG emissions by 2030 as compared to 1990. On the other hand, the world needs to anticipate, adapt and become resilient to the current and expected future impacts of climate through policies and disaster resilience preparation (supporting the Sendai framework for Disaster Risk Reduction).¹³

FRS can contribute to this SDG by decarbonising their operations and supply chains through continuously improving energy efficiency, reducing the carbon footprint of products, services and processes, and setting ambitious emissions-reduction targets in line with climate science, as well as scaling up investment in the development of innovative low-carbon products and services. A good example is the London Fire Brigade who reduced their carbon

emissions by 50% from 1990 through their sustainable development strategy.⁸

In addition, FRS should build resilience in their operations, supply chains and the communities in which they operate, i.e. participate in transdisciplinary disaster planning and exercises to tune, train and test response plans.



SDG 14 aims to conserve and sustainably use the oceans, seas and marine resources for sustainable development, reduce marine pollution and acidification, and restore marine ecosystems. Water discharge to rivers or groundwater will end up in oceans, impacting marine biodiversity and natural infrastructure while creating global socio-economic problems, including health, safety and financial risks.

Water-pollution sources for FRS are obviously fire water and include waste water from building services such as sanitary and tap water. By reviewing incident response tactics for minimising water usage, we not only address SDG 3 but also SDG 14: less water is also less pollution. Assure proper fire-water containment before it runs off into rivers or soil, then safely transport and treat it with the objective of recycling it. Work with port authorities to plan readily available oil booms in marine areas and minimise pollution for marine life and water intake of desalination plants, etc.

SDG15's goal is to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss.

Globally, improvements to land management could provide an estimated 37% of the mitigation needed to stabilise



warming below 2°C by 2039.¹⁴ Land management can also mitigate the negative effects that climate-induced ecosystem transformations have on biodiversity and watersheds, which influence ecosystem services that contribute to human well-being.

Wildfires are among the most demanding incidents to control and often a nightmare for firefighters. Rising temperatures due to climate change increase the likelihood of such events. Projections for much of the US West alone show that an average annual 1°C temperature increase would increase the median burned area per year as much as 600% in some types of forests.¹⁶

What actions can an FRS take to improve its sustainability?

Sustainable development will be out of the comfort zone of many experienced fire chiefs. How to embed this into an existing FRS and define the first actions with impact? To support these fire chiefs a simple model is developed (Figure 2). This model structures the FRS organisation in three layers: its tasks, resources and the way to organise the resources to execute those tasks. These three layers are linked with the local risk profile of the FRS service area. With the collectively decided ambition of the FRS and the objective to embed the SDG framework in its DNA and realise its societal benefits, the list of actions can be structured according to the layers.

These three questions can be used as a guideline to develop the action list:

1. What actions can we take to optimise positive impact in the work and **tasks** we perform?
2. What actions can we take to optimise

Figure 2



positive impact in the **resources** we use for our work?

3. What actions can we take to optimise impact in the way we **organise** our work effectively?

The model illustrates how the three layers interact, determined by the risk profile. Although simplified, the model enables any size of FRS to start with the SDGs and explain the shared value it creates to its stakeholders.

Corporate governance

1. Develop a sustainability strategy in collaboration with FRS-stakeholders. Integrate your strategy with that of the local authority (public fire service), corporate strategy (private fire service) and sector initiatives. Set goals, key performance indicators (KPIs) and reporting periods. Have the board of your organisation commit to the strategy and publish your sustainability strategy and progress in your annual reporting.
2. Evaluate impact of climate change, develop governing scenarios and update/develop response plans for natural hazards (drought, flooding, hurricanes). Also consider the impact of temperature rise on risks and intervention tactics.

3. Increase resources and work with local authorities and communities to reduce likelihood and impact of wildfires (forest zoning, clearing space between structures, use fire-resistant building design features, remove fuels). Develop recovery plans before a fire hits and implement plans quickly after a fire to reduce erosion, limit flooding and minimise habitat damage.¹⁷

Execution of tasks

1. Investigate more water-efficient firefighting technologies and tactics for its Standard Operating Procedures.
2. Take responsibility over clean-ups and restoration of water ecosystems to ensure sustainable water withdrawals. Contain and treat run-off firewater to avoid contamination of soil and surface waters.
3. When suppression tactics need supplementing agents such as foam or powder, evaluate the use of lowest possible volumes and substances least hazardous for the environment. Replace foam applications with non-toxic, fluor-free foams. Revise firefighting strategies accordingly.
4. Advise building and warehouse owners to install sprinklers. According to research by FM Global the use of

Simultaneous Monitoring, Assessment and Response Technology (SMART) sprinklers or Automated Water Cannons (AWC) can reduce water demand by 50–92% and GHG emissions by 97.8% for building fires.^{18,19}

5. Adopt a water stewardship strategy to address the economic, social and environmental aspects of water. Adopt values and practices that aim to safeguard long-term availability of clean water and the provision of sanitation for all stakeholders.

Utilisation of resources

1. Reducing GHG emissions by looking into energy-reducing technologies and procedures, switching to renewable energy sources for electricity, heating and transport. Exchange combustion engines for vehicles, pumps, ladders etc. as much as possible for electrical motors.
2. Switch to renewable energy to power fire station, heating, cars and fire trucks, i.e. switch to an electrified fleet provided you use renewable energy and install charging stations powered by solar panels and batteries. Promote use of public transport and cycling to work where feasible.



▲ The fire service should only use foam when it's completely bio-degradable.

3. Design, build, operate and maintain fire stations according to LEED (Leadership in Energy and Environmental Design) standards.²³ Plan early replacement of old energy-intensive fire stations by new low-energy stations. Governments and financial institutions often provide favourable conditions on funding for green buildings.
4. Reduce the use of drinking water in firefighting operations by buffering rainwater collected from roofs and pools or use, where possible, grey water and desalinated water as a buffer in the firewater system. Build strategies to reduce water usage for non-firefighting purposes: washing of PPE, clothes, showers, cooking.
5. Reduce water and GHG emissions from food and clothing: promoting plant-based diets and looking into sustainable clothing (1 burger or cotton T-shirt uses 2,495 litres of water,²⁰ enough to supply a family for one week with water for drinking, cooking and sanitation).

Getting things organised

1. Work with other groups such as governments, ports, community groups, companies and peers to improve local governance to address identified challenges. Set up Joint Ventures and Mutual Aids with partners that do various work better than you can.
2. Set Science Based Targets¹⁵ to commit to GHG reduction, implement the plans and measure results.

3. Ensure all employees and their families have ample access to safe drinking water and adequate sanitation, and raise awareness about hygiene practices.
4. Design services and processes such that natural resource consumption and waste are minimised: Reduce, Reuse and Recycle. Require suppliers to design products according to circular economy principles.
5. Organise legal structures and labour conditions in the FRS that support gender neutrality, positions for which one income is enough to run a family and support for positive SDG behaviour is embedded.

Conclusion

The SDGs form an ambitious target for 2030 to build a sustainable world. The purpose and mission of Fire & Rescue Services supports the SDGs across its three layers: environment, social and economic. In this article we discussed how FRS can embed the SDGs that contribute to the environmental aspects of sustainability. With only nine years left to 2030 this is the decade of action.²¹ We suggest 18 actions that can be included in your sustainability strategy. In a subsequent article, we will discuss the social and economic aspects of the SDGs and how they relate to FRS.



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